Arizona Department of Public Safety

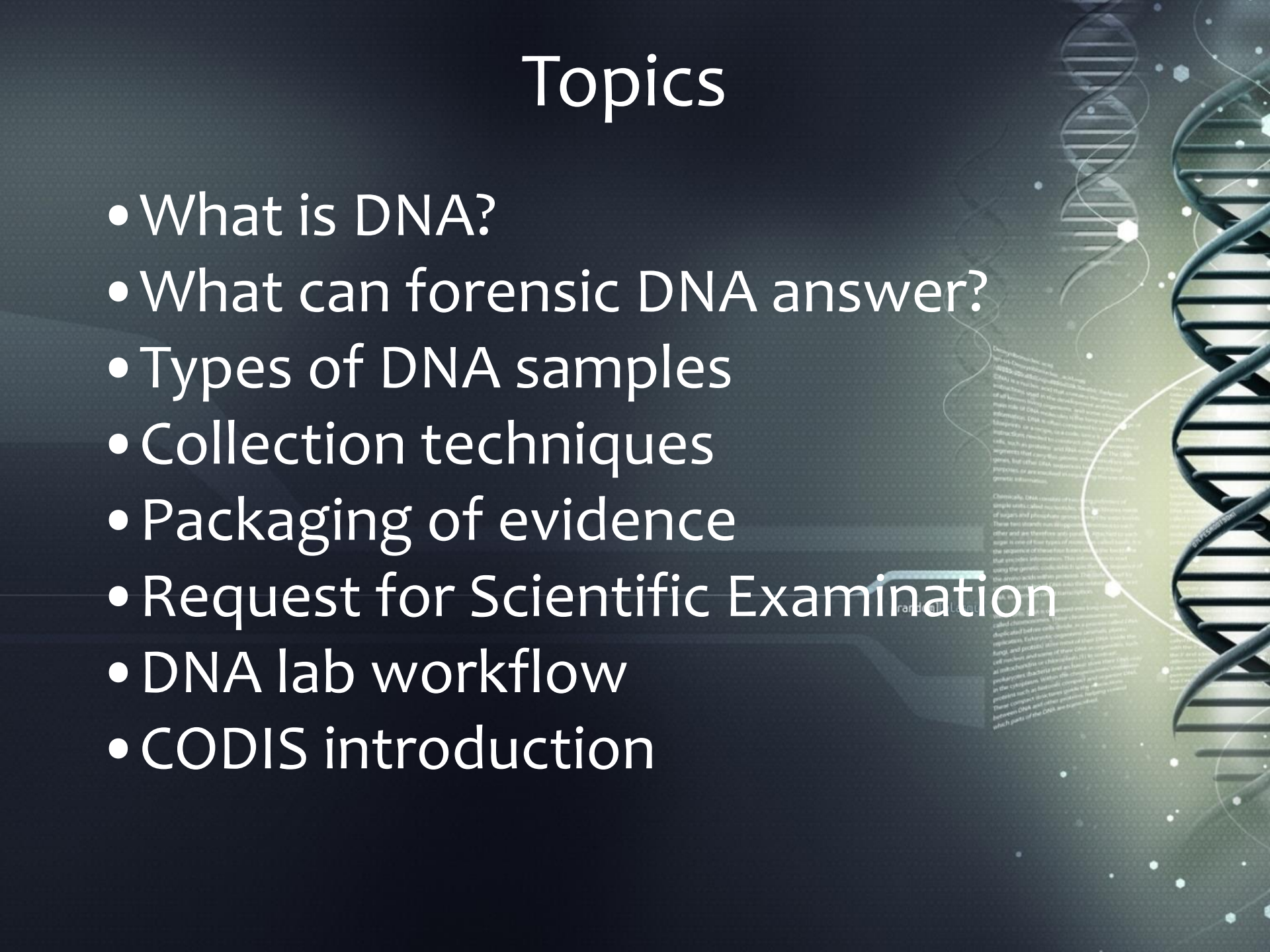
DNA Casework

Evidence collection and submission

What can DNA do for you?

Topics

- What is DNA?
- What can forensic DNA answer?
- Types of DNA samples
- Collection techniques
- Packaging of evidence
- Request for Scientific Examination
- DNA lab workflow
- CODIS introduction



Jargon

Law Enforcement

ABH =

Actual Bodily Harm

PNC =

Police National Computer

WINQ =

Warrant Inquiry

DNA Lab Nerd

PCR =

Polymerase Chain Reaction

CE =

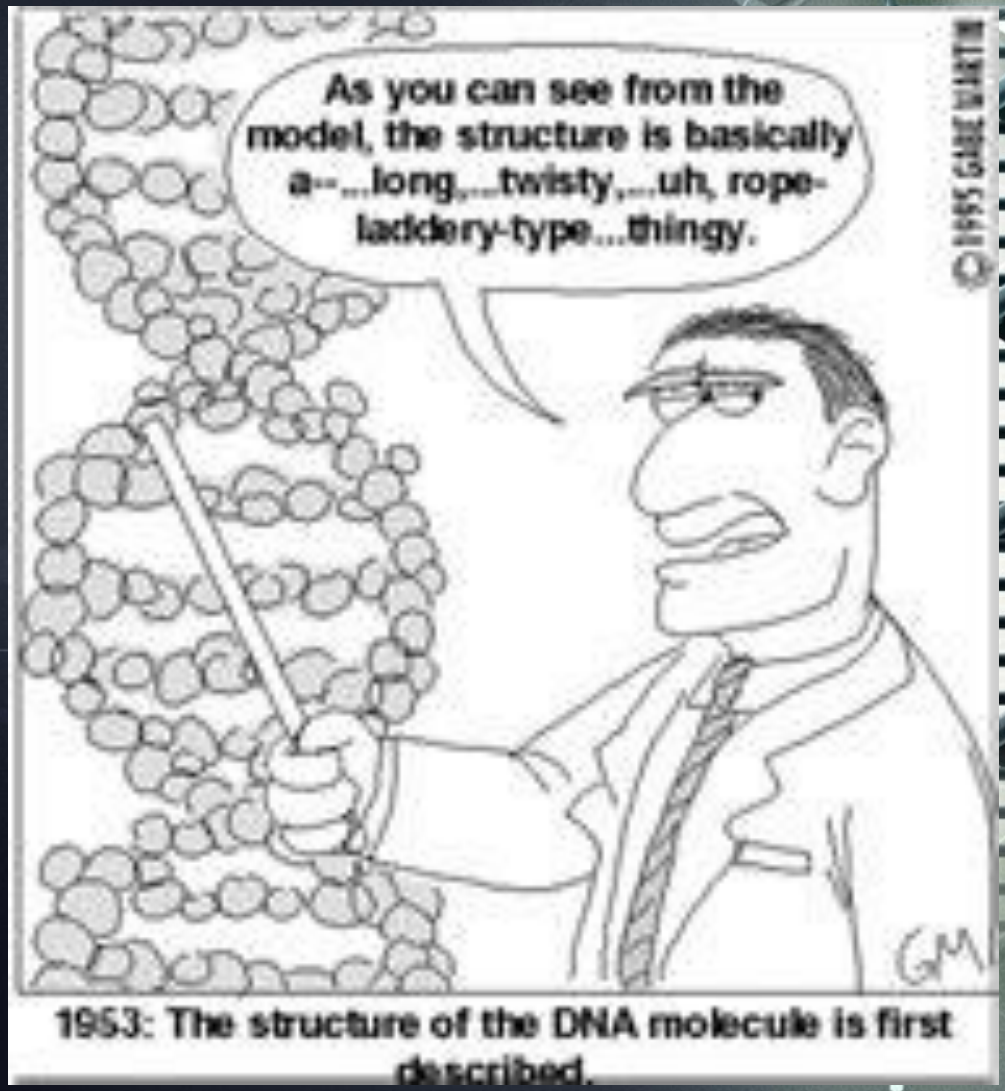
Capillary Electrophoresis

Language is important!

What is DNA?

1953: The structure of the DNA molecule is first described.

"As you can see from the model, the structure is basically a… long,… twisty,… uh, rope-laddery-type… thingy.



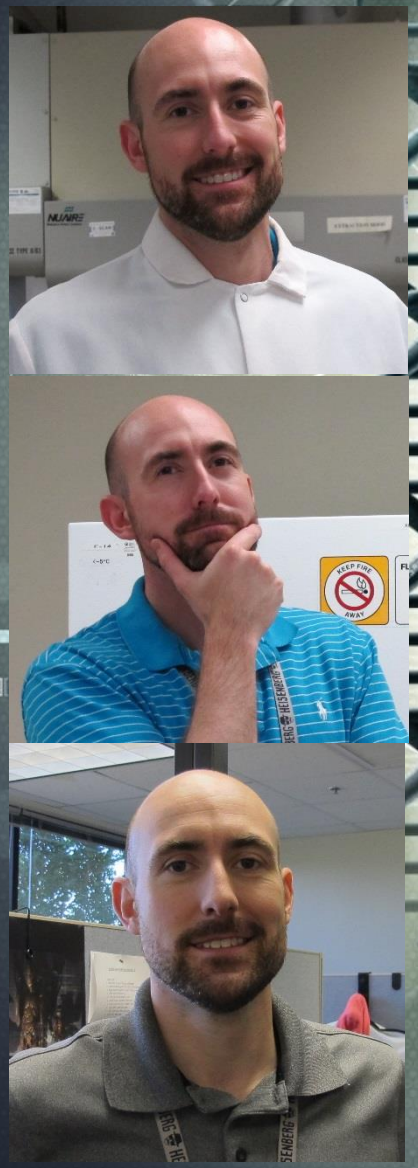
What is DNA?

- DNA stands for Deoxyribonucleic Acid
- DNA is the genetic instructions inherited from mother and father

What is DNA?

- Can be found in most cells in the body. Best sources of DNA are body fluids and tissues.
- DNA is unique to each individual

(exception - identical siblings)



Because DNA is unique to an individual, it is useful in forensic investigations.

Understanding *how* DNA can help your investigation will help you apply this technology in the most effective manner.

What Can Forensic DNA Answer?

In terms of each case, think about what questions you are trying to answer and how DNA can help you answer those questions.

? ? ? ? ?

Some cases are just not DNA cases.

What Can Forensic DNA Answer?

Can help generate investigative leads in cold cases and cases without a suspect, utilizing CODIS (national database)

Example: A DNA profile from a cigarette butt found at the crime scene is put into CODIS and "hits" a profile already in CODIS.

What Can Forensic DNA Answer?

Whether a particular DNA profile is present on an item or at a crime scene (forensic evidence triangle)

Example: The DNA profile from the blood found on the knife collected from the suspect matches the DNA profile of the victim.

Forensic Evidence Triangle

What Can Forensic DNA Answer?

Perpetrator of a sex crime if we develop DNA profiles from Sex Crime Evidence Kits (SCEK)

Example: The DNA profile from semen found on the victim's body matches the suspect.

What Can Forensic DNA Answer?

Familial questions (ex. criminal paternity).

Example: Pregnancy resulting from a sexual assault or sexual contact with a minor (can test DNA from the baby or aborted fetus to compare with mother and/or suspect).

What Can Forensic DNA Answer?

Identity of an individual

Examples:

- Unidentified human remains (DPS will do only if it's related to a crime)
- Unknown identity cases (unable or unwilling to identify themselves)

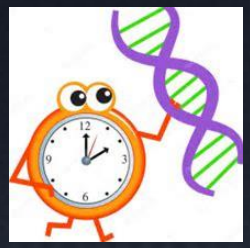
What CAN'T Forensic DNA Answer?

How the DNA got there

There are many ways DNA can be transferred to an item: touching, sneezing, talking, transferring of bodily fluids and natural shedding of skin cells.

What CAN'T Forensic DNA Answer?

When the DNA got there



No time frame on how long DNA will last, it depends on several factors as well as how much DNA was left behind.

"World's Oldest Genome Sequenced From 700,000-Year-Old Horse DNA"

- By **Jane J. Lee**, National Geographic, June 27, 2013

What CAN'T Forensic DNA Answer?

Whether an item was or was not handled by an individual

Again, there are many ways for someone's DNA to be transferred to an item.

What CAN'T Forensic DNA Answer?

Consent

Example: A sexual assault where the suspect claims the sexual contact was consensual.

Types of DNA Samples

We have broken them down into three categories:

Types of DNA Samples

The “Good” (blood, saliva & semen)

The “Bad” (trace/touch DNA)

The “Ugly” (urine, feces & vomit)

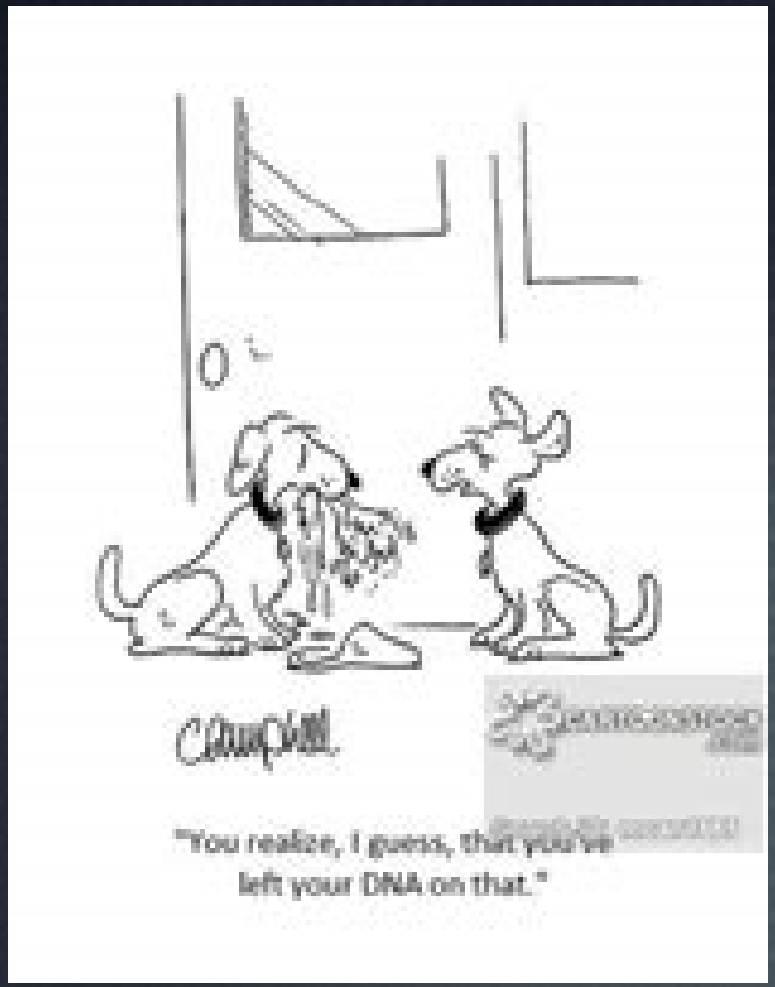
“The Good”

Blood, saliva and semen

- Usually very good sources for DNA
- Usually single source samples
- Usually need less sample to get results

Types of DNA Samples

"You realize, I guess, that you've left your DNA on that."

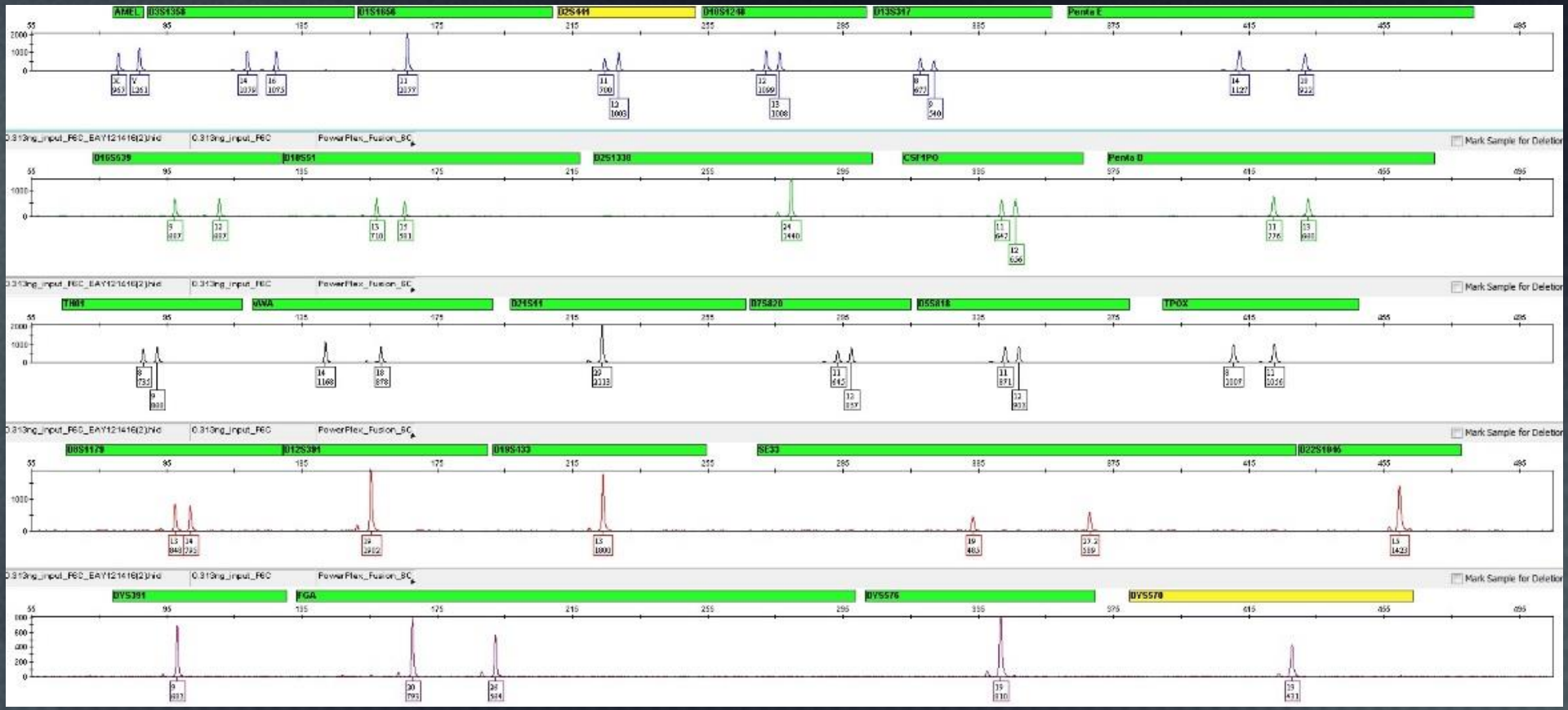


“The Bad”

Trace/Touch DNA

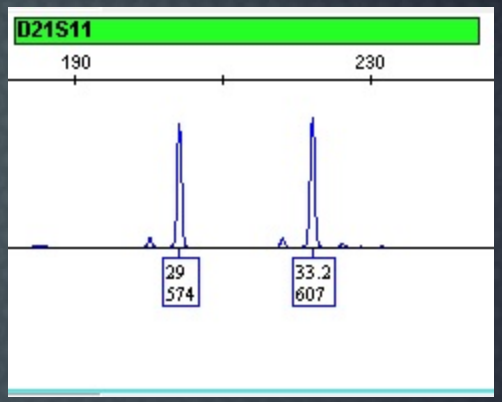
- Often results in DNA mixtures of multiple people
- Generally a very limited source of DNA
- Sweat is considered a trace DNA sample

Single Source DNA Profile

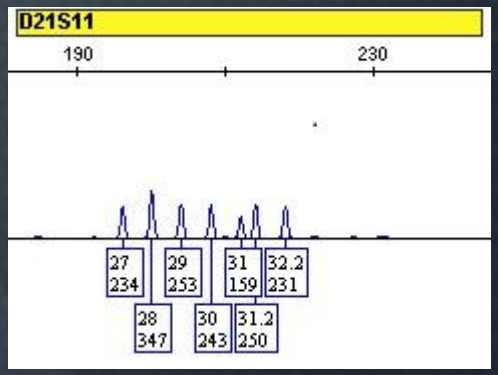


Each location usually has only one or two peaks

What Does A Mixture Look Like?



Single source – Usually one or two peaks per location



Mixture – Many peaks per location

Can be very difficult to interpret

What Does A Mixture Look Like?

“The Bad”
Trace/Touch DNA

- Usually harder to get good results
  - In theory, only a small number of cells are needed for DNA analysis
  - *However…*

“The Bad”

- Touching a surface or item briefly usually leaves very little, *if any*, sample
- Better samples would be something handled/used over a long period of time (hat, cell phone, shirt, sunglasses)

"The *REALLY* Bad"

Trace, "touch" DNA

- Shell casings
  - Last resort item
  - Cannot be a dual request item (ex. cannot do both latent prints and DNA on a casing)
    - It is an item that is only touched briefly
    - Undergoes extreme heat (can destroy DNA)
    - Very small surface area

“The Ugly”

Urine, feces, vomit, etc.

Not tested routinely for DNA

- Feces: swab the outside
- Vomit: swab
- Urine: call the lab

DNA Samples

Generally Better Samples of Each Type*

Blood

Ex. Blood on broken window at point of entry

Saliva

Ex. Cigarette butt or water bottle

Mucus

Ex. Used tissue

Semen

Ex. Used condom

**Please note that the condition of the sample, amount and other factors can affect the quality of the sample.*

Short break

Collection Techniques

To avoid contamination of DNA evidence, always take the following precautions:

- Wear gloves. Change them often.
- Use disposable instruments or thoroughly clean them after each item of evidence.
- Avoid touching the area where you believe DNA may be present
- Avoid coughing, sneezing or talking over the evidence (even if you're wearing a mask).


WE'VE GOT A NEW DNA DATABASE...
WOW! THAT'S NOT TO BE SNEEZED AT.
CARTOONSTOCK .com
Search ID: jby0333

Collection Techniques

To avoid contamination of DNA evidence, always take the following precautions:

- Avoid touching your face, nose and mouth while collecting evidence.
- Air-dry evidence thoroughly before packaging
- Put evidence in new paper bags or envelopes. Avoid plastic bags.

Collection Techniques

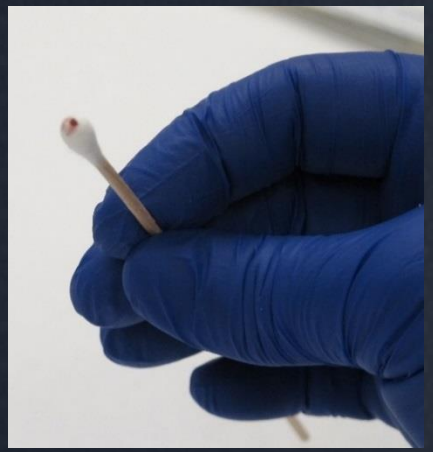
Blood

- Large bloodstains on a non-porous surface
  - Two swabs
  - Saturate swabs

Collection Techniques

Blood

- Small bloodstains on non-porous surface
- One slightly wet swab
  - Concentrate stain on tip of swab



Collection Techniques

Blood

- Large bloodstains on clothing or bedding
  - Send to us for testing

  or

  - Cut out stained areas and send to us (document or photograph evidence before cutting)

Collection Techniques

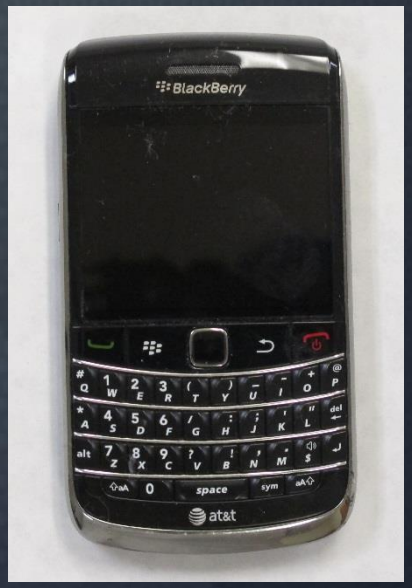
Blood

- Small bloodstains on clothing or bedding
  - Send to us for testing
  - May circle any stains of interest

Collection Techniques

Blood

- Bloodstains on small, easily packaged items (cell phone, tools, water bottle, etc.)



  - Send us the entire item

Collection Techniques

Saliva

- Send in small, easily packaged items (bottles, cans, cigarette butts), we will process them.
- If you are swabbing an item:
  - Concentrate sample on no more than two wet swabs
  - Swab vigorously around mouth area!

Collection Techniques

Trace

- Send in small, easily packaged items (bottles, cans, tools, etc.), we will swab them.
- If you are swabbing an item:
  - Concentrate sample on no more than two wet swabs
  - Swab vigorously!

Don’t forget to collect elimination standards!

Examples:

- Swabs from home - All occupants of the residence
- Vehicle swabs - All drivers of the vehicle
- Firearm – Anyone who uses the firearm
- Victim
- Consensual sex partner(s)

For Touch Cases

It doesn't matter who touched the item *last*. There are many considerations:

Who else has touched this item?

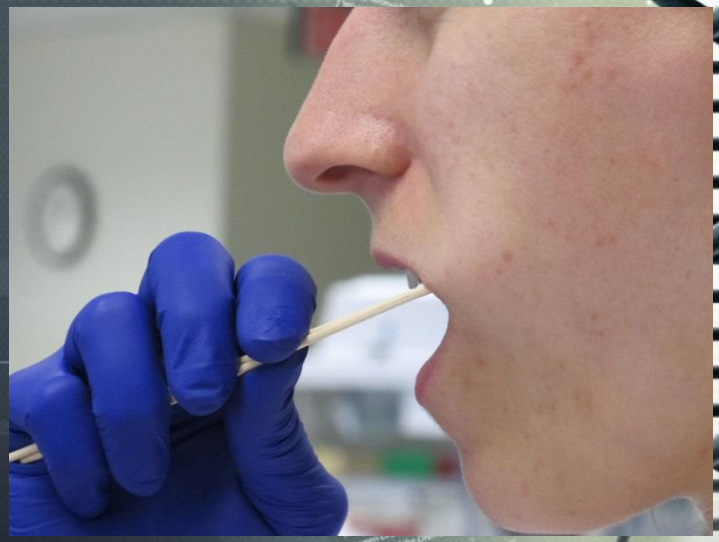
How long did the person handle it?

Some people "shed" more DNA than others.

**Cleaning products do not necessarily remove DNA*

Known Standards = Buccal Swabs

Buccal - inner cheek of a person's mouth.
Buccal swab – swab from the inner cheek of a person's mouth.



- When collecting buccal swabs, take 2 swabs of the inner cheek.

- Please ensure that buccal swabs are labeled with person's name.

Suspect Standards

Can be used to do a direct comparison to the evidence.

This is useful on evidence that is not CODIS eligible.

Suspect Standards

- Convicted offender and arrestee samples in CODIS *CANNOT* be used as suspect standards
- Must be collected and submitted by law enforcement (chain of custody)
- A suspect standard is required to confirm a match made in CODIS

No Suspect Standard Received

- Agency never tells Lab about Known Suspect
  - Case evidence processed for DNA
  - DNA profile from foreign contributor unknown
  - DNA profile from foreign contributor to CODIS
  - **Report issued**
  - DNA "hit" occurs (investigative lead)
  - **Hit report issued**
  - Agency needs warrant to get known standard
  - Known standard submitted to Lab
  - DNA testing on known standard and comparison to evidence made
  - **New report issued with match to suspect and statistical significance**
  - **Done**

Suspect Standard Received

- Agency alerts Lab of Known Suspect
  - Known standard is submitted
  - Case evidence and all known standards processed for DNA
  - Comparison between foreign contributor and suspect made
  - DNA profile from foreign contributor to CODIS
  - **Report issued with match to suspect and statistical significance**
  - **Done**

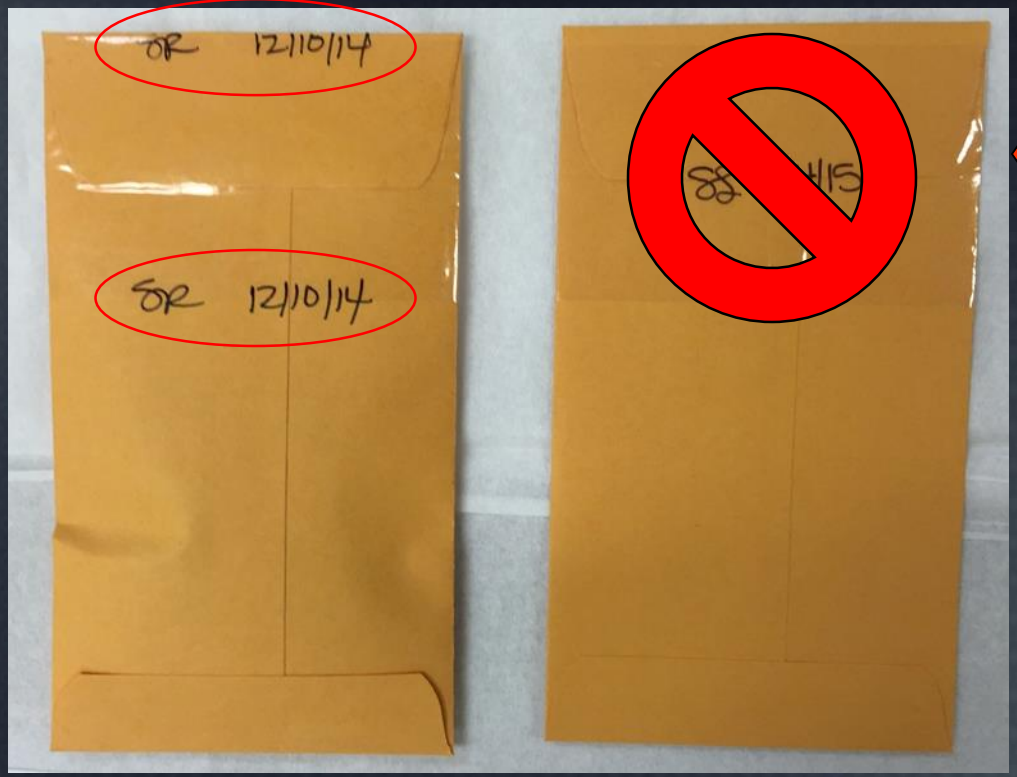
Collection Techniques

Dual Requests

- DNA and Latent Prints/Firearms
  - DNA must be collected first.
  - Items undergoing DNA analysis must be handled by someone who is wearing gloves and a mask to prevent contamination.

Packaging of Evidence

Markings/ initials are on tape and the package = TAPE SEALED



Markings on tape *do not* overlap onto the package = NOT TAPE SEALED

Please be sure all markings are accurate (item #, names, etc.)

ARIZONA DEPARTMENT OF PUBLIC SAFETY

NON-DPS AGENCY REQUEST FOR SCIENTIFIC EXAMINATION

PHOENIX – (602)223-2394 FLAGSTAFF – (928)773-3684
TUCSON – (520)746-4575 LAKE HAVASU – (928)680-5490

DPS DR #

AGENCY	SUBMITTING AGENCY CASE #	PAGE ____ OF ____

CASE OFFICER	ID#	OFFICER'S DIRECT WORK PHONE

CASE OFFICER EMAIL	

SPECIAL INSTRUCTIONS/CASE HISTORY

S= SUSPECT V= VICTIM O= OTHER

(1) ASSOCIATED INDIVIDUALS (LAST, FIRST, M) D.O.B.
CHARGE(S) S ☐ V ☐ O ☐

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HAS THIS EVIDENCE BEEN EXAMINED BY ANOTHER AGENCY? ☐ YES ☐ NO IF YES, EXPLAIN

CHAIN OF CUSTODY

DPS P&E USE ONLY	ITEM(S)/PACKAGE(S)	FROM NAME	ID NO.	TO NAME	ID NO.	PURPOSE	DATE/TIME

THE ARIZONA DEPARTMENT OF PUBLIC SAFETY CRIME LABORATORY WILL HAVE INITIAL DISCRETION OVER THE SELECTION OF TEST ITEMS AND METHODS FOR ANALYSIS.

DPS 802-01550 REV. 12/2015 ***DISTRIBUTION: White- Evidence, Yellow- Agency, Pink- Lab***

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Please Keep in Mind

- Usually we do not test evidence that has had any previous testing by another lab.
- Using Bluestar/Luminol (or similar) at crime scenes can dilute stains and limit our chances of getting a DNA profile.

Supplemental Information

- Case information/synopsis
- Sex Crimes Evidence Kit paperwork

ATTENTION ALL OUTSIDE AGENCIES

Effective July 1, 2018

AZDPS Crime Lab DNA Evidence Submission Supplement will be *required* for all DNA analysis requests

Due to the Crime Lab's desire to provide better customer service and increase efficiency, starting **July 1st, 2018,** the laboratory will require submission of the current version of the SAB's DNA Evidence Submission Supplement with *every DNA request*.

- The DNA Evidence Submission Supplement must be complete and attached to the Request for Scientific Examination form.
- Only DNA requests and related evidence accompanied by this completed form will be accepted by the AZDPS Property and Evidence Unit.

For a copy of the required form, please e-mail one of the following:

AZDPS Southern Regional Crime Lab (Tucson):
SRCL_DNA@AZDPS.gov
AZDPS Central Regional Crime Lab (Phoenix):
CRCL_DNA@AZDPS.gov
AZDPS Northern Regional Crime Lab (Flagstaff):
NRCL_DNA@AZDPS.gov

DNA Supplemental Form

Arizona Department of Public Safety Crime Laboratory
DNA Evidence Submission Supplement

Answer the questions below and attach to request form or email to the appropriate lab handling your request.
Lack of information or incomplete answers will result in the delay of analysis.
PHOENIX: crcl_dna@azdps.gov TUCSON: srcl_dna@azdps.gov FLAGSTAFF: nrcl_dna@azdps.gov

All questions must be answered.

Agency:_____ Agency Case Number:_____

Officer/Det:_____ Badge#_____ DPS DR Number:_____

Direct Email:_____ Direct Phone:_____

Offense(s):_____ Trial Date:_____

1. Describe what happened in this case (or attach a short case summary):

2. How does each item submitted relate to the crime, **and** where was it found?

3. Identify the 5 most probative items:

4. If blood was present at the scene, how many people were bleeding? _____ How does each person relate to the crime?

5. What is believed to be the source of DNA for each item?

Source:	Item Number(s)
Blood	
Saliva	
Touch	
Other (Please identify):	

		Y	N
6.	Was the item(s) located in an area accessible to the public (e.g., sidewalk, front yard, parking lot)? *If YES, please contact the Laboratory before submission.*		
7.	Was the item(s) left behind by the perpetrator?		
8.	Does the item(s) belong to the victim?		
9.	Was the item(s) present at the crime scene before the crime was committed?		
10.	Has the item(s) ever been handled by someone other than the perpetrator (e.g., owner/victim)? *If YES, an elimination standard from this person must be submitted under the same DPS DR number.*		
11.	Was the item(s) taken directly from the suspect or from something belonging to the suspect (e.g., backpack, car, etc.)? *If YES, please contact the Laboratory before submission.*		
12.	**If a sexual assault, does the victim have a consensual sex partner within 120 hours of the alleged assault?** *If YES, an elimination standard from this person must be submitted under the same DPS DR number.*		

13. Is there any additional important information that the laboratory needs to know (e.g., victim & perpetrator live together)?

If there is one or more perpetrators in the case or if anyone other than the perpetrator (victim/owner/residents) has touched the evidence item ever, elimination standards from this (these) individual(s) must be obtained and **SUBMITTED IN A SEPARATE ENVELOPE UNDER THE SAME DPS DR NUMBER.**

Evidence origin information is required by the FBI to determine CODIS eligibility requirements. Form Effective: 10/2017

Form completed by:_____ Badge#:_____ Date of completion:_____

DNA Supplemental Form

Is the evidence eligible to enter into CODIS?

Do we need additional DNA standards?

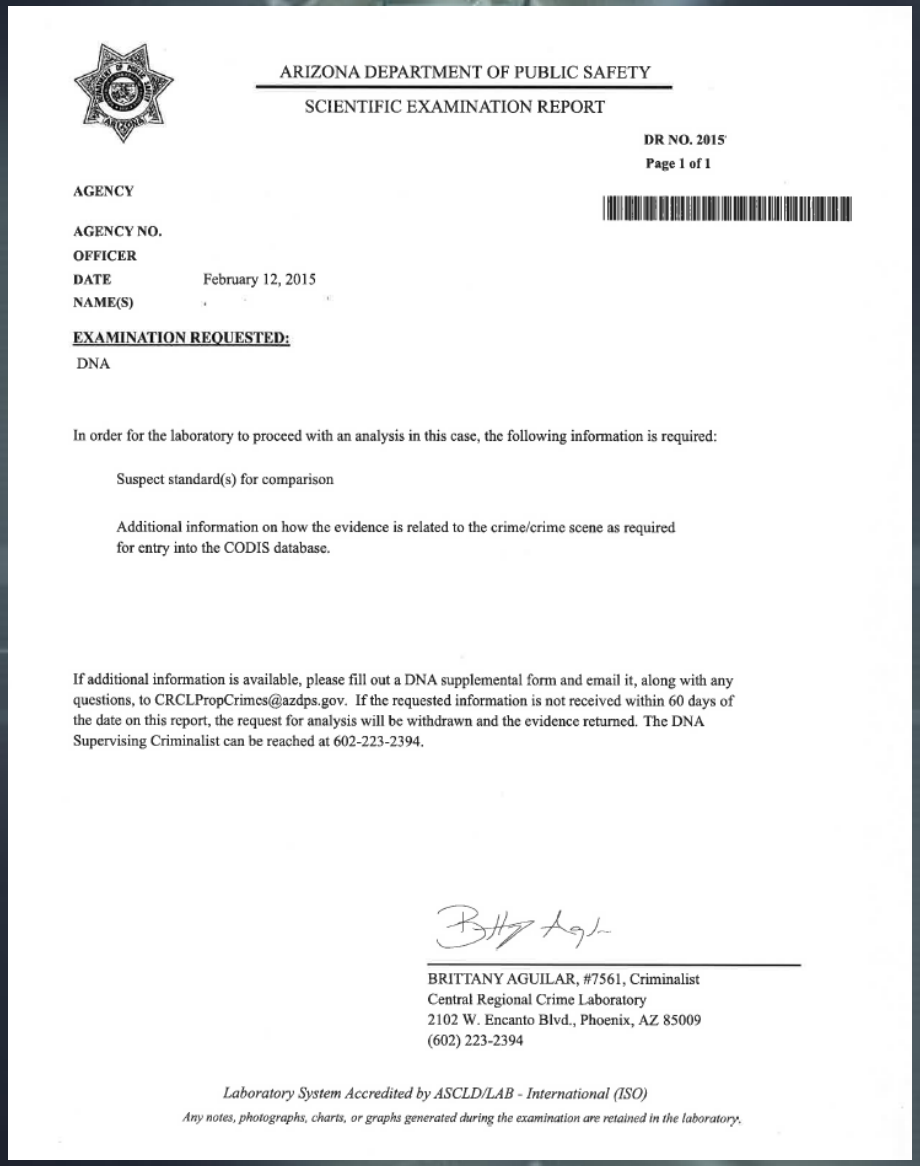
Please be detailed!

Agency Notification

- An effort to obtain standards and/or CODIS eligibility information

- Cases missing information will be issued a notification

-Case analysis is on hold for 60 days. After 60 days, if we receive no response, the request for DNA will be withdrawn.



ARIZONA DEPARTMENT OF PUBLIC SAFETY

SCIENTIFIC EXAMINATION REPORT

DR NO. 2015

Page 1 of 1

AGENCY

AGENCY NO.

OFFICER

DATE February 12, 2015

NAME(S)

EXAMINATION REQUESTED:

DNA

In order for the laboratory to proceed with an analysis in this case, the following information is required:

Suspect standard(s) for comparison

Additional information on how the evidence is related to the crime/crime scene as required for entry into the CODIS database.

If additional information is available, please fill out a DNA supplemental form and email it, along with any questions, to CRCLPropCrimes@azdps.gov. If the requested information is not received within 60 days of the date on this report, the request for analysis will be withdrawn and the evidence returned. The DNA Supervising Criminalist can be reached at 602-223-2394.

BRITTANY AGUILAR, #7561, Criminalist
Central Regional Crime Laboratory
2102 W. Encanto Blvd., Phoenix, AZ 85009
(602) 223-2394

Laboratory System Accredited by ASCLD/LAB - International (ISO)

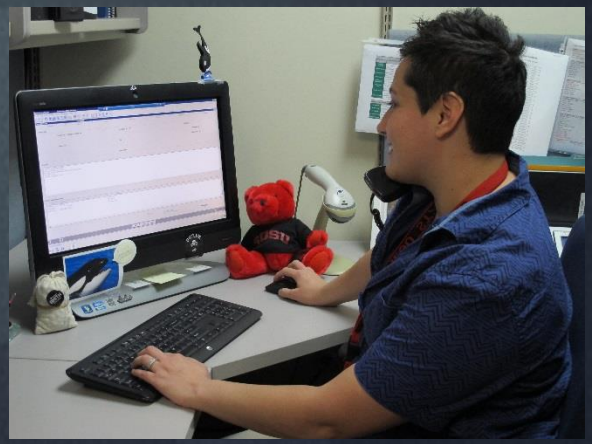
Any notes, photographs, charts, or graphs generated during the examination are retained in the laboratory.

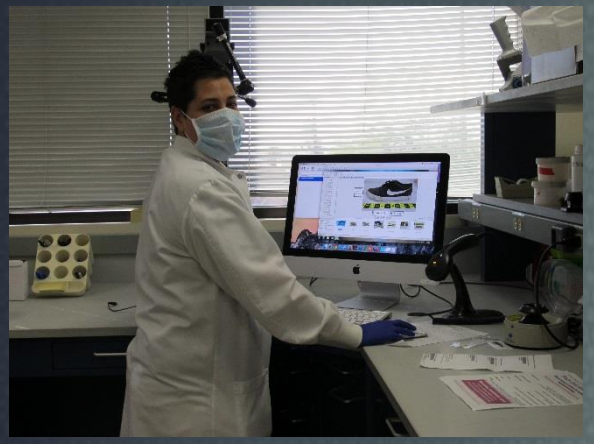
Why We Ask for Supplemental Information

- Triage cases
  - Who does the item belong to?
  - What type of bodily fluid?
  - How many possible bleeders?
  - How many assailants/victims?
- Determine required standards
- Determine CODIS eligibility

How Providing Supplemental Information Benefits You

- We can start work on your case faster
- We will not need to use up your time with phone calls/e-mails
- We will be spending more of our time working on your cases in the lab instead of making phone calls
- Helps to streamline overall lab workflow

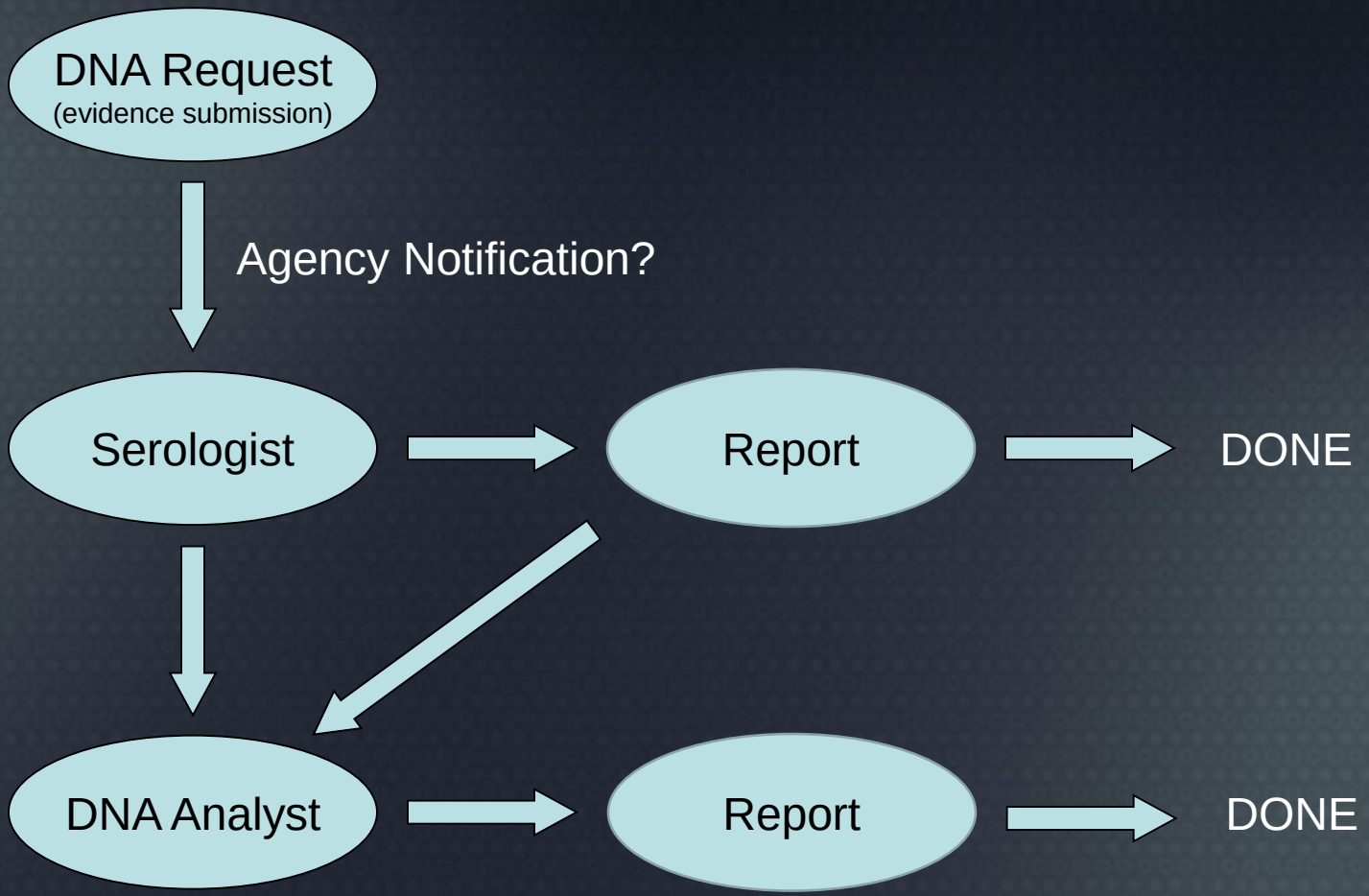




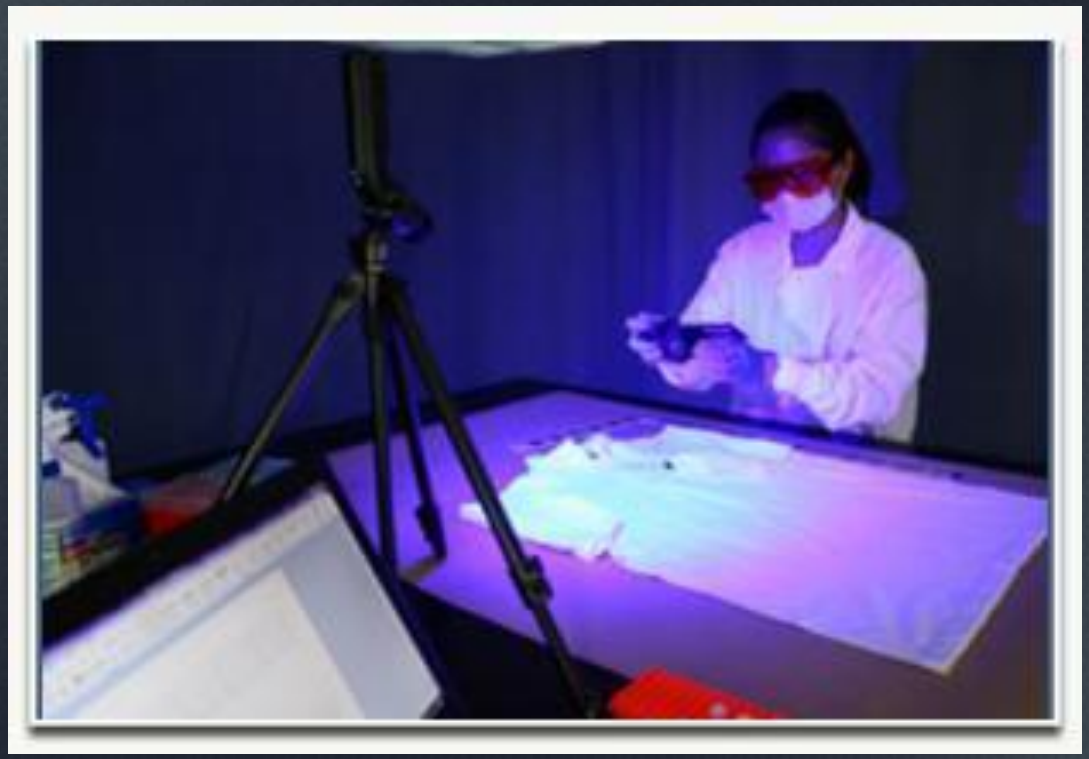
Short break


YOU KNOW WHO'S BEEN NAUGHTY AND WHO'S BEEN NICE? – YOU'RE NOT USING DNA EVIDENCE, ARE YOU?

AZDPS Central Regional Crime Lab DNA Workflow



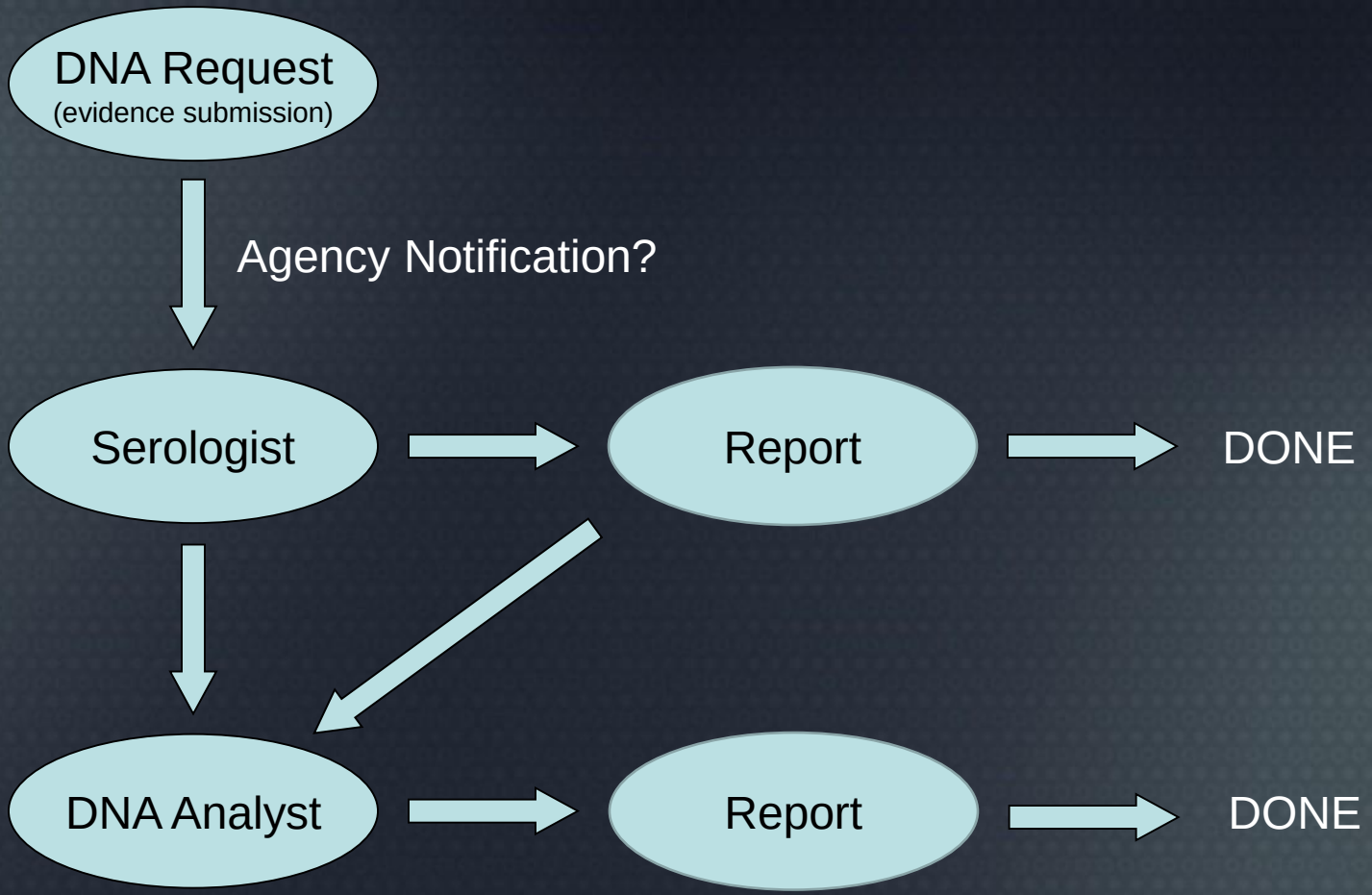
Serology is always the first step towards DNA analysis



Serologist

- Reads all submitted information
- Contacts Detective if necessary
- Analyzes for possible blood, semen, saliva, touch DNA, etc.
- Retains cuttings, swabs, etc. for DNA Analyst
- May issue a report to submitting Detective/Officer
- **In most cases action from you will be required**

AZDPS Central Regional Crime Lab DNA Workflow

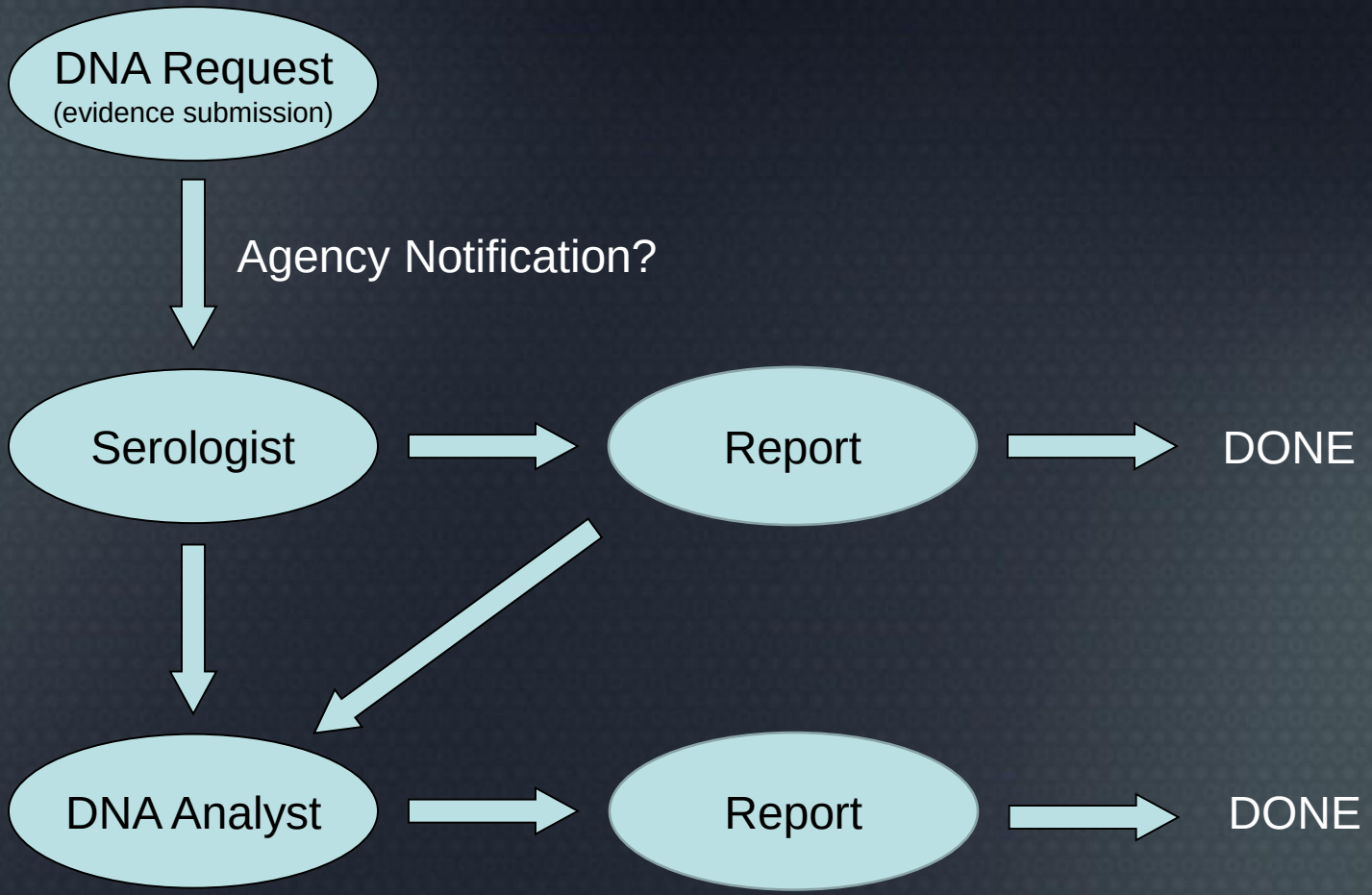


DNA Analyst

- Extracts DNA from cutting, swab, etc. retained by Serologist
- Potentially obtain a DNA profile(s) and enter into CODIS
- Interpret/compare DNA profile(s)
- Issue a report to submitting Detective/Officer

Note: Not all samples tested for DNA will yield usable results.

AZDPS Central Regional Crime Lab DNA Workflow



CODIS

National DNA Database

Combined DNA Index System

- Useful for generating a suspect
- Useful for linking suspects and/or cases nationwide.

CODIS

Not all DNA profiles that we get from evidence are eligible to enter into CODIS.

CODIS is managed by the FBI and they have rules that we must follow.

CODIS Eligibility

Questions we *must* answer about the evidence in order to use CODIS

- Was a crime committed?
- Where was the evidence collected from within the crime scene?

CODIS Eligibility

Questions we *must* answer

- Was the DNA on the evidence likely left by the perpetrator of the crime (not a victim or other person)?
- Was the evidence seized or collected directly from a suspect's possession? (Not CODIS eligible)

CODIS

Reasons a profile may not be CODIS eligible:

- Elimination standards were not received
- The evidence did not meet CODIS eligibility requirements
- We were not able to obtain a DNA profile or not enough of a profile to meet CODIS rules
- Complicated mixture

CODIS Eligibility Information

Where, specifically, was the item located in relation to the crime scene?

Please be detailed and specific on the DNA Supplemental Form about where each item was located.

CODIS Eligibility Information

Was the item located in an area where the public has access (i.e. sidewalk, front yard, parking lot)? If YES, please explain (how can the item be attributed to the perpetrator).

CODIS Eligible Examples

- Item #1 is a cigarette butt found inside burglarized residence. Owners confirmed it did not belong to them.
- Item #2 is a swab of red/brown stain located on broken window glass at point of entry.
- Item #3 is a hat collected from the fenced backyard of the residence. It does not belong to the occupants.

Examples that *may not* be CODIS eligible:

- In the front yard of a burglarized residence
- On the ground outside of a recovered vehicle
- In an empty lot nearby a burglarized business

Scenario

A perpetrator grabs a woman's purse in a public parking lot, jumps into a car and drives away. The victim states that she saw the perpetrator throw his soda cup to the ground as he jumped into the car. She points out the cup and straw in the parking lot. The cup and straw are collected and submitted for DNA analysis.

- If a complete DNA profile is obtained from the cup/straw, will that profile be eligible to upload in CODIS?

Scenario

Yes, if the victim is positive that it is the same cup that the perpetrator threw to the ground.

CODIS Eligibility Information

Can anyone confirm that the item does *not* belong to the victim and/or that the item was *not* present prior to the crime?

Considerations

Did the victim deny ownership of the item?

Ex. “We do not smoke. This cigarette butt isn’t ours.”

Did the victim state the item or body fluid wasn’t present prior to the incident?

Ex. “This Coke can wasn’t in my car when it was stolen.”

Scenario

A suspect was stopped by the police and pulled a gun on the officer, but then dropped it and fled. The suspect was not apprehended, but the gun was collected.

- Can the DNA profile from the gun go into CODIS?

Yes

Considerations

If the item does belong to the victim, but is believed to have suspect DNA on it:

Victim elimination standards must be submitted in most cases.*

*An exception would be in the case of blood left behind at a scene.

CODIS Eligibility Information

Has the item been handled by anyone other than the suspect (i.e. owner/victim)?

If yes, in most cases elimination standards must be submitted under the same DR# for each individual.*

* An exception to this would be in the case of blood.

Scenario

The offense in this case is felon in possession of a firearm. The DNA profile from a swabbing of the gun matches the suspect. The gun was collected from a backpack that was recovered from the suspect.

- Can the DNA profile from the gun go into CODIS?

No

Scenario

Detectives investigating a residential burglary locate a cigarette butt in the front yard of the home near the sidewalk. None of the occupants living in the home smoke.

- Can the DNA profile from the cigarette butt go into CODIS?

No

Scenario

- A gun is found under the seat of a suspect's car. He says he has no idea how it got there and has never seen it before. DNA is requested to show that he *handled* the gun.

  Will DNA answer that question?

Scenario

- *NOT NECESSARILY*
- Finding his DNA on the gun doesn't absolutely prove that he handled it.
  - Sneezing/saliva
  - Skin cells
- NOT finding his DNA on the gun doesn't prove he DIDN'T handle it
- Latent print analysis may be more effective/efficient at answering this

Scenario

- Victims answer their door late at night and multiple suspects enter and commit a home invasion/robbery. Only one suspect was identified, but he was not connected to the scene through DNA. On that same night, a suspicious scene unfolded in the same neighborhood, where a lady said that there was a knock on her door, but she did not answer. As the people were leaving, she saw one discard a bottle on her lawn…

Scenario

The investigator thought these two incidents may be related, so he recovered the bottle and submitted it for analysis in connection with the first case. A DNA profile was obtained from the bottle, however, it does not match the identified suspect from the first incident.

- Can the DNA profile from the bottle go into CODIS?

No

Final Questions

CONTACT INFORMATION

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